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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup> :</b> <b>H04L 12/56</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 98/39881</b> <b>(43) International Publication Date:</b> 11 September 1998 (11.09.98)
<b>(21) International Application Number:</b> PCT/SE98/00392 <b>(22) International Filing Date:</b> 4 March 1998 (04.03.98)  <b>(30) Priority Data:</b> 9700805-6                      7 March 1997 (07.03.97)                      SE  <b>(71) Applicant (for all designated States except US):</b> TELIA AB (publ) [SE/SE]; Mårbackagatan 11, S-123 86 Farsta (SE).  <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> LATOUR-HENNER, Alexander [SE/SE]; Ormingeringen 55 C, S-132 33 Saltsjö-Boo (SE). BJÖRKMAN, Nils [SE/SE]; Fatburs Kvarngata 7, S-118 64 Stockholm (SE).  <b>(74) Agent:</b> PRAGSTEN, Rolf; Telia Research AB, Vitsandsgatan 9, S-123 86 Farsta (SE).		<b>(81) Designated States:</b> EE, LT, LV, NO, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
<b>(54) Title:</b> PACKET-ORIENTED NETWORKS  <b>(57) Abstract</b>  The invention relates to a device and a method which makes possible to automatically find out how much resources with regard to i.a. bandwidth that need to be allocated at a given flow of traffic in a telecommunication network and data communication network. The invention attends to this by building up a base of knowledge which makes possible optimization of booked resources in a packet-oriented communication network. Said base of knowledge is built up in two steps and is used after each step to automatically allocate necessary resources. A first measuring to adapt the maximal transmission rate of the terminal to the traffic intensity which the terminal generates includes measuring of least possible momentary consumption of resources for maximally allowed delay in the terminal. A second measuring to adapt allocated resources in the network to what the terminal generates for the whole duration of a given situation includes measuring of the traffic characteristics of the terminal and modification of allocated resources in the network on a statistical description of generated traffic.		

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## TITLE OF THE INVENTION: PACKET-ORIENTED NETWORKS

## TECHNICAL FIELD

5       The present invention relates to a device and a method  
at a telecommunication network or data communication  
network which appoints how much network resources, for  
instance bandwidth, that need to be allocated for a given  
traffic situation.

10

## PRIOR ART

Packet-oriented networks, such as ATM-networks or IP-  
networks, can handle traffic flows of varying need of  
resources over the time. In order to guarantee quality,  
15 combined with efficiency, to the terminal, resources in  
form of buffer storage and bandwidth need to be allocated  
in both terminal and network.

The question which the present invention intends to  
answer is how a terminal automatically can appoint how much  
20 resources that need to be allocated for a given situation.  
One type of situation is a type of recurring events which  
have similar need of resources from time to time, for  
instance a certain application, or communication with a  
certain type of terminal. Because a number of factors have  
25 influence on the need of resources, it is difficult to  
without measurement estimate this only by knowledge of  
included components such as operative system, application,  
communication card, communication protocol, type of  
terminal, and selected configuration of these.

30 In modern packet-oriented networks, for instance ATM-  
networks or IP-networks, it is, as has been mentioned above,  
in principle possible to allocate just any amount of  
resources (bandwidth and buffer storage) to a connection.  
The task to appoint how much resources that will be  
35 allocated is for the terminal. The problem with the  
terminals and/or applications of today, however, is that

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they are lacking ability to appoint their need of resources.

The aim with the present invention consequently is to solve this problem and produce a terminal which can appoint  
5 said need of resources.

#### SUMMARY OF THE INVENTION

This aim is achieved by a device and a method which is presented in the characterizing part of the patent claim 1  
10 respective the patent claim 5.

The measuring methods which are included have been verified by laboratory tests for an extensive spectrum of IP-applications over ATM-networks.

The measuring methods according to the invention have  
15 turned out to function very satisfactorily with regard to the appointing of need of resources in a subscriber terminal.

Further characteristics of the present invention are given in the subclaims.

20

#### DETAILED DESCRIPTION OF AN EMBODIMENT OF THE INVENTION

In the following first a general description of how the terminal and the measuring method according to the present invention functions is given. After that a terminal  
25 and a measuring method will be described which is especially intended for ATM-networks.

The terminal according to the invention is intended to build up own knowledge which makes possible successive optimization of booked resources in a packet-oriented  
30 network. This knowledge is built up in two steps and is after each step used to automatically allocate the resources:

First the terminal attends to an initial measurement to adapt the maximal transmission rate of the terminal to  
35 the traffic intensity which the terminal generates for a

given situation. The measuring is performed in following steps:

1. Measure least possible "momentary" consumption of resources for maximally allowed delay in the terminal.
2. Set measured transmission rate in traffic shaper.
3. Modify allocated resources in the network to the transmission rate to which the traffic shaper is set.

After that the terminal attends to a continued measuring to adapt allocated resources in the network to what the terminal generates for the whole duration of a given situation. The measuring is performed in following steps:

1. Measure the traffic characteristics of the terminal for "utilization of longer duration".
2. Modify allocated resources in the network based on a statistical description of generated traffic.
3. Store obtained values both "momentary" and "utilization of longer duration" until next time the situation is repeated for setting of traffic shaper and allocation of network resources.

In the following a measuring method is described which is specific for ATM-networks.

The initial measuring to adapt the PCR (Peak Cell Rate) of the terminal to the traffic intensity which the terminal generates for a given situation is performed in the following way:

1. Measure least possible PCR for maximally allowed delay in the buffer to the ATM-shaper of the terminal. The delay can, for instance, be measured by application of the standardized GCRA-algorithm.
2. Set measured PCR in traffic-shaper.
3. Modify allocated resources in the network to the PCR to which the traffic shaper is set. The need of

resources can for instance be communicated by means of standardized protocols for signalling in ATM-networks.

Continued measuring to adapt allocated resources in the network to what the terminal generates for the whole  
5 duration of a given situation:

1. Measure the traffic characteristics of the terminal in terms of SCR (Sustainable Cell Rate) och MBS (Maximum Burst Size).

2. Modify allocated resources in the network in terms  
10 of SCR and MBS.

3. Store obtained values of PCR, SCR/MBS until next time the same situation is repeated.

Even if a situation in the starting position may seem to be similar to a previously analysed case, it is  
15 necessary to continuously supervise the buffer state of the traffic shaper, making it possible to adjust the allocation of resources and by that avoid impaired service quality.

The invention is preferably used in subscriber terminals in connection with preparations for establishing  
20 of the connection over a packet-oriented network, for instance ATM-network or IP-network.

The above mentioned is only to be regarded as an advantageous embodiment of the invention, and the extent of protection of the invention is only defined by what is  
25 indicated in the following patent claims.

## PATENT CLAIMS

1. Device at a telecommunication network or data communication network which appoints how much network resources, for instance bandwidth, that need to be  
5 allocated for a given traffic situation,  
c h a r a c t e r i z e d in that it itself measures, stores and signals its need of network resources in said telecommunication network or data communication network.
2. Device according to patent claim 1,  
10 c h a r a c t e r i z e d in that it includes a database for storing of information which makes possible a successive optimization of booked network resources in said network.
3. Device according to patent claim 2,  
15 c h a r a c t e r i z e d in that it attends to an initial measuring to adapt the maximum transmission rate of the terminal to the traffic intensity which said device generates for a given situation, and that it attends to a continued measuring to adapt allocated resources in said  
20 network to resources which said device generates for the whole duration of a given situation.
4. Device according to patent claim 3,  
c h a r a c t e r i z e d in that it includes a traffic shaper which sets measured transmission rate, and that said  
25 networks are packet-oriented networks, such as ATM-networks or IP-networks.
5. Method at a telecommunication network or data communication network, including a device which appoints how much network resources, for instance bandwidth, that  
30 need to be allocated for a given traffic situation,  
c h a r a c t e r i z e d in that the need of network resources of said device is measured, stored and signalled in said telecommunication network or data communication network.
- 35 6. Method according to patent claim 5,

c h a r a c t e r i z e d in that an initial measuring to adapt the maximal transmission rate of said device to the traffic intensity which said device generates for a given situation is effected in the following steps:

- 5 a) measure least possible momentary consumption of resources for maximally allowed delay in the device;
- b) set measured transmission rate in a traffic shaper;
- c) modify allocated resources in the network to the transmission rate to which the traffic shaper is set.

10 7. Method according to patent claim 6,

c h a r a c t e r i z e d in that a continued measuring to adapt allocated resources in the network to resources which said device generates for the whole duration of a given situation is effected in the following steps:

- 15 a) measure the traffic characteristics of said device for the utilization of a longer space of time;
- b) modify allocated resources in said network based on a statistical description of generated traffic;
- c) store obtained values of momentary consumption of resources and consumption of resources for the utilization during a longer space of time, until next time the situation is repeated for setting of said traffic shaper and allocation of network resources.

8. Method according to patent claim 7,

- 25 c h a r a c t e r i z e d in that said networks are packet-oriented networks such as ATM-networks and IP-networks, and that said resources relate to bandwidth and buffer storage.

9. Method according to patent claim 8,

- c h a r a c t e r i z e d in that said device is a
- 30 subscriber terminal intended for ATM-network, at which said initial measurings relates to the PCR of said terminal to the traffic intensity which the terminal generates for a given situation, and that in said continued measuring is appointed the traffic characteristics of said terminal in
- 35 terms of SCR, MBS and PCR.



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 98/00392

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
<b>IPC6: H04L 12/56</b> According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols)		
<b>IPC6: H04L</b>		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
<b>SE,DK,FI,NO classes as above</b>		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
<b>WPI</b>		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0748141 A2 (AT&T IPM CORP.), 11 December 1996 (11.12.96), page 2, line 25 - line 37  --	1-9
A	EP 0719012 A2 (ALCATEL DATA NETWORKS), 26 June 1996 (26.06.96), page 1, line 46 - page 2, line 36  -- -----	1-9
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Date of the actual completion of the international search		Date of mailing of the international search report
11 August 1998		13 -08- 1998
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**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

27/07/98

International application No.

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